

## ABSTRACT OF THE DISCLOSURE

A method of making a vertical diode is provided, the vertical diode having associated therewith a diode opening extending through an insulation layer and contacting an active region on a silicon wafer. A titanium silicide layer covers the interior surface of the diode opening and contacts the active region. The diode opening is initially filled with an amorphous silicon plug that is doped during deposition and subsequently recrystallized to form large grain polysilicon. The silicon plug has a top portion that is heavily doped with a first type dopant and a bottom portion that is lightly doped with a second type dopant. The top portion is bounded by the bottom portion so as not to contact the titanium silicide layer. For one embodiment of the vertical diode, a programmable resistor contacts the top portion of the silicon plug and a metal line contacts the programmable resistor.